an X-ray tube including a grid connected to a grid bias connection, a cathode connected to a filament bias connection, an anode connected to an anode bias connection; and

a variable voltage supply connected between the grid bias connection and the filament bias connection to produce a negative output voltage level at the grid bias connection with respect to the filament bias connection, the output voltage level of the variable voltage supply adapted to produce a first voltage level to focus an electron beam, a second voltage level to collect ions, and a third voltage level to stop the electron beam.

2. (Amended) The X-ray tube subsystem of claim 1, wherein the second voltage level is substantially less in magnitude than the first voltage level.

3. (Amended) The X-ray tube subsystem of claim 1, wherein a magnitude of the second voltage level is greater than 100 volts, and a magnitude of the first voltage level is in a range of 10 to 30 volts.

4. (Amended) The X-ray tube subsystem of claim 1, further comprising a Faraday cage surrounding the variable voltage supply.

9. (Twice Amended) A method for operating an X-ray system to reduce high voltage breakdown events, the method comprising:

providing an X-ray tube that includes a grid connected to a grid bias connection and a cathode connected to a filament bias connection; and

during X-ray tube operation, varying a voltage level between the grid bias connection and the filament bias connection to produce a first voltage level to focus an electron beam, a second voltage level to collect ions, and a third voltage level to stop the electron beam.

10. (Amended) The method of claim 9, wherein the second voltage level is substantially less in magnitude than the first voltage level.

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11. (Amended) The method of claim 9, further comprising selecting the second voltage level to minimize high voltage breakdowns within the X-ray tube before examination.

12. (Amended) The method of claim 9, further comprising providing a Faraday cage surrounding a variable voltage supply that generates the first voltage level, the second voltage level, and the third voltage level.

14. (Twice Amended) An X-ray examination system comprising:

an X-ray tube including a grid connected to a grid bias connection and a cathode connected to a filament bias connection;

B3 a variable voltage supply connected between the grid bias connection and the filament bias connection to produce a negative output voltage level at the grid bias connection with respect to the filament bias connection, the output voltage level of the variable voltage supply adapted to produce a first voltage level to focus an electron beam, a second voltage level to sweep free ions out of the X-ray tube, and a third voltage level to stop the electron beam;

an X-ray detector to receive the electron beam; and

readout electronics connected to the X-ray detector.

15. (Amended) The X-ray examination system of claim 14, wherein a magnitude of the second voltage level is in a range of 10 to 30 volts.

16. (Amended) The X-ray examination system of claim 14, further comprising a Faraday cage surrounding the variable voltage supply.

18. (Amended) The X-ray examination system of claim 14, wherein the second voltage level is selected to minimize high voltage breakdowns within the X-ray tube before examination.

20. (Twice Amended) The X-ray examination system of claim 14, wherein the X-ray tube operates under a tube voltage in the range of 100-150kV, a magnitude of the first voltage level is greater than 100 volts, and a magnitude of the second voltage level is in a range of 10 to 30 volts.

21. (Amended) The X-ray tube subsystem of claim 1, wherein said X-ray tube forms positive ions about said cathode, and said second voltage level at said grid is negative with respect to said filament bias connection to cause said positive ions to be collected at said grid.

22. (Amended) The method of claim 9 wherein said X-ray tube produces positive ions about said cathode, and said second voltage level at said grid is negative with respect to said filament bias connection causing said positive ions to be collected at said grid.